

Japanese Crucian Carp (*Carassius cuvieri*)

Ecological Risk Screening Summary

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1 Native Range and Nonindigenous Occurrences

Native Range

From Britton (2011): “*C. cuvieri* is endemic to Lake Biwa, Japan (Yamamoto, 2006).”

Nonindigenous Occurrences

From Britton (2011):

“The species was introduced to Korea from Japan in 1972 and intentionally released to rivers and reservoir as a food source (Jang et al., 2002). In South Korea, religious practises present a secondary dispersal route; during the Buddhist ceremony of “life-releasing”, introduced species - such as *C. cuvieri* – are often released to new habitats (Jang et al., 2002).”

“From Froese and Pauly (2010): China (Tan et al. 1989), Korea (Kim et al. 2005), and Taiwan (Shen 1993)”

Means of Introduction

Intentionally introduced to China (Tan et al. 1989), Korea (Kim et al. 2005), and Taiwan (Shen 1993) to improve the inland fisheries (aquaculture). Also release during religious ceremonies (Britton 2011).

Status

No known occurrences in the US.

Impact of Introduction

In Korea, the intentional release of Japanese crucian carp has led large scale reductions of the native goldfish. The invasive carp can now be found throughout most of Korea (Kim and Kim. 2009).

Remarks

This species is already listed as prohibited for live specimens in Vermont (Vermont Agency of Natural Resources (2010).

From Britton (2011):

“Gaps in Knowledge/Research Needs

There are considerable knowledge gaps on invasive populations of *C. cuvieri*. The potential risk arising from their hybridization and competition with other species of the genus *Carassius* is certainly worthy of further investigation.”

2 Biology and Ecology

Taxonomic Heirarchy

From ITIS (2012):

Kingdom Animalia
 Phylum Chordata
 Subphylum Vertebrata
 Superclass Osteichthyes
 Class Actinopterygii
 Subclass Neopterygii
 Infraclass Teleostei
 Superorder Ostariophysii
 Order Cypriniformes
 Superfamily Cyprinoidea
 Family Cyprinidae
 Genus *Carassius*
 Species *Carassius cuvieri*

Taxonomic status: valid

Size, Weight, Age

From Froese and Pauly (2010):

“Max length : 35.0 cm SL male/unsexed; (Shao et al. 1991)”

Environment

Demersal; freshwater (Froese and Pauly 2010)

Climate/Range

Temperate (Froese and Pauly 2010)

Distribution

Asia: Japan and Taiwan (Froese and Pauly 2010)

Short description

From Britton (2011):

“The head is large and broadly triangular, the snout short and blunt. The eye is moderately large, with the interorbital space broad. The mouth is arched and slightly oblique, with thick lips. There are no barbels present. The body is compressed, belly rounded, body depth high; the dorsal profile is conspicuously arched and the caudal peduncle is thick and short. Scales are cycloid and large; the lateral line complete. Lateral line scale count: 29-33; dorsal fin rays: IV, 15-18; pelvic fin rays: 1+8; anal fin rays: III, 4-5; last simple dorsal and anal ray serrated posteriorly. Dorsal fin base long. Dorsal fin origin above pelvic fin origin; pectoral fin end reaches pelvic fin origin; pectoral and pelvic fins at lower side of body; caudal fin forked (Shen 1993; Chen and Fang 1999).”

Biology

From Britton (2011):

“In their native range, *C. cuvieri* spawn from April to July, primarily in and around emergent vegetation during flooding after a heavy rain. The larvae remain in the vegetation until their juvenile stage (Yamamoto 2006).”

“This is a polyphagous species feeding on a wide range of food, including plants, diatoms, crustacean and aquatic insects.”

“*C. cuvieri* will shoal with other species of the genus *Carassius* (Yamamoto 2006).”

Human uses

Aquaculture: commercial (Froese and Pauly 2010)

Diseases

No OIE reportable diseases for this species.

Threat to humans

None listed

3 Impacts of Introductions

In Korea, the intentional release of Japanese crucian carp has led large scale reductions of the native goldfish. The invasive carp can now be found throughout most of Korea (Kim et al. 2009)

From Britton (2011):

“Impact on Biodiversity

The species is morphologically similar to *C. auratus* and often shares similar habitats. It has received less attention from ecologists and the public because of this morphological similarity. Consequently, it has been argued that hybridization and a shift in the ecological role of *C. auratus* merits further investigation (Jang et al. 2002).”

“Impact: Social

C. cuvieri has been identified as an intermediate host of the parasite *Clinostomum complanatum*. This parasite is the causative agent in four of the nine human cases of *Clinostomum* infection reported in Japan; the consumption of infected fish is the pathway of infection to humans (Aohagi et al. 1992).”

4 Global Distribution



Figure 1 (above). Global distribution of *C. cuvieri*. Map from Google Inc. (2011).



Figure 2 (above). Global distribution of *C. cuvieri*. Map from GBIF (2011).

5 Distribution in the United States

No known locations within the United States.

6 CLIMATCH

Summary of Climate Matching Analysis

The climate match (Australian Bureau of Rural Sciences 2010; 16 climate variables; Euclidean Distance) was high in some parts of the country. Very high matches were found in the central plains states, the northern Mid-Atlantic region, and throughout southern Florida. Climate 6 match indicated that the continental United States has a very high climate match. The range for very high climate match is 0.103 and greater, climate match of the *C. cuvieri* is 0.420..

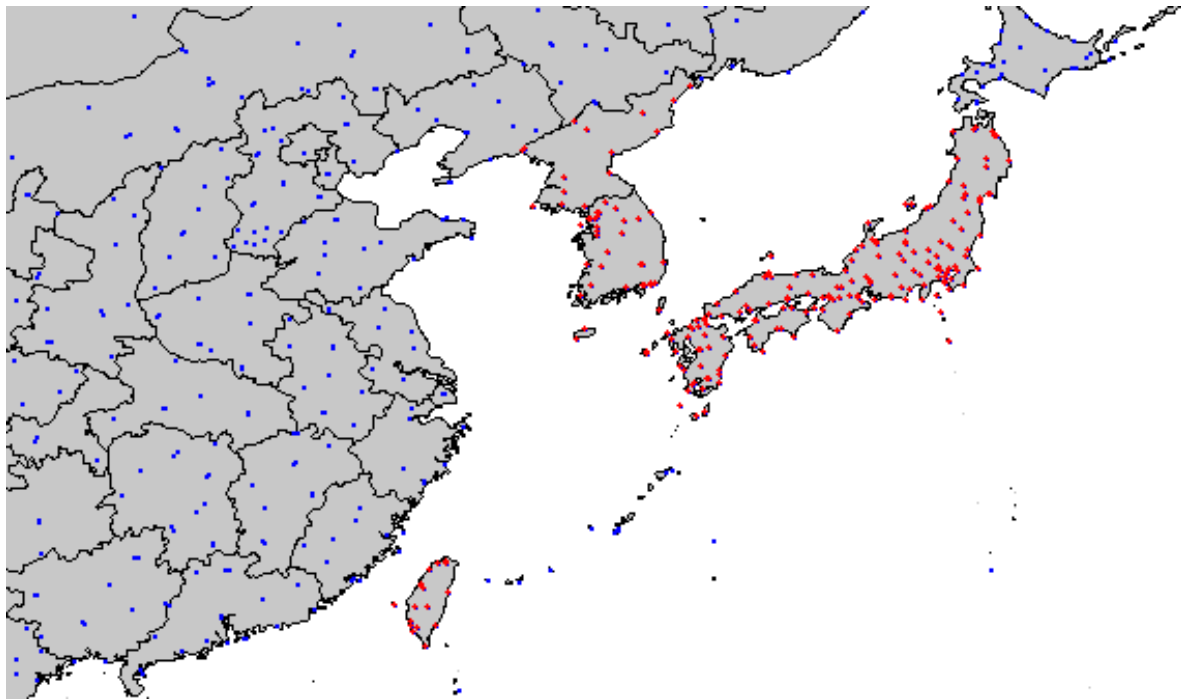


Figure 3 (above). CLIMATCH (Australian Bureau of Rural Sciences 2010) source map showing weather stations selected as source locations (red) and non-source locations (blue) for *C. cuvieri* climate matching. Source locations from GBIF (2011) and Froese and Pauly (2010).

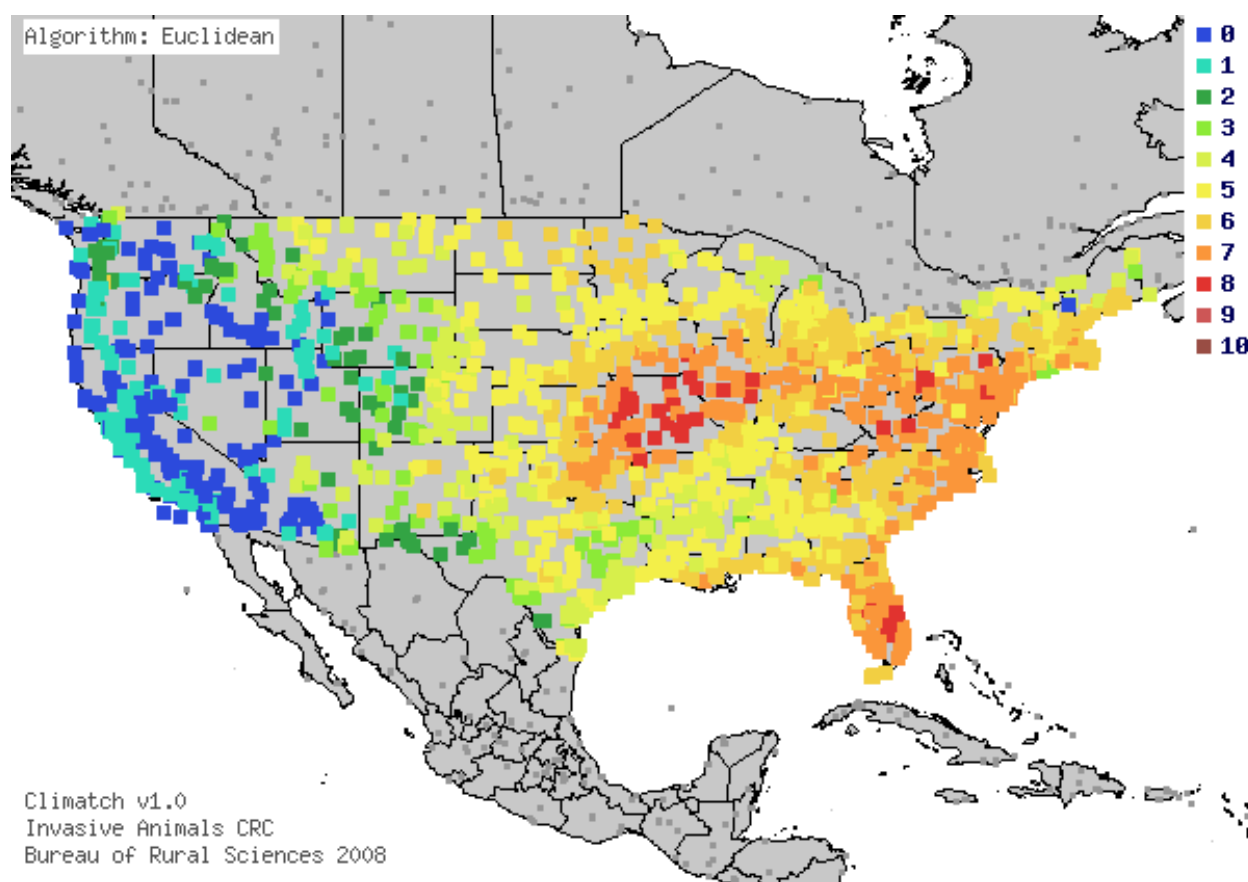


Figure 4 (above). Map of CLIMATCH (Australian Bureau of Rural Sciences 2010) climate matches for *C. cuvieri* in the continental United States based on source locations from GBIF (2011) and Froese and Pauly (2010). 0= Lowest match, 10=Highest match.

Table 1 (below). CLIMATCH (Australian Bureau of Rural Sciences 2010) climate match scores.

CLIMATCH Score	0	1	2	3	4	5	6	7	8	9	10
Count	192	145	83	109	215	410	431	353	52	0	0
Climate 6 Proportion =			0.420 (High)								

7 Certainty of Assessment

Although *Carassius cuvieri* has become established in neighboring countries outside of its native range, there are no known established populations within U.S. borders. While researchers have identified potential impacts from this species in newly established habitats, there is insufficient evidence of adverse impacts reported in peer-reviewed literature. In order for this ERSS to have a higher level of certainty, more research is needed. The certainty of this risk is low, and risk level is therefore uncertain.

8 Risk Assessment

Summary of Invasiveness

From Britton (2011):

“*C. cuvieri* is endemic to Lake Biwa, Japan, and has been introduced to neighbouring countries as a food fish. Similar in appearance and behaviour to other members of the genus *Carassius*, it associates with confamilials and occupies a similar niche. In this respect, its ability to displace or hybridise with native members of the family represents a potential threat to native fish diversity. The similarity in appearance and presence of hybrids presents difficulties in identification, with potential for further inadvertent spread. Secondary dispersal pathways for religious purposes is an issue but is being addressed by a public awareness campaign.”

Summary of Risk Assessment

The invasion of Japanese crucian carp into Korean waters, and the subsequent reduction of the native goldfish is demonstrative of the potential invasive ability of this species. However, other than one study in Korea, data on the impacts of the Japanese crucian carp in introduced waters are absent. It should be noted that several other species in the genus *Carassius* have become very successful invaders, including the native goldfish that the Japanese crucian carp has successfully outcompeted in Korea.

Assessment Elements

- **History of Invasiveness (Sec. 3):** Medium
- **Climate Match (Sec. 6):** High
- **Certainty of Assessment (Sec. 7):** Low
- **Overall Risk Assessment Category:** Uncertain

9 References

Note: The following references were accessed for this ERSS. References cited within quoted text but not accessed are included below in Section 10.

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10 References Quoted But Not Accessed

Note: The following references are cited within quoted text within this ERSS, but were not accessed for its preparation. They are included here to provide the reader with more information.

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